SEARCHER

SIGNAL LEAKAGE LOCATOR

OPERATING AND MAINTENANCE MANUAL

TRILITHIC

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P/N 001-070-00
REV E

Serial Numbers C2090 and above

TRILITHIC
9202 E. 33rd STREET
INDIANAPOLIS, IN 46236

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INTRODUCTION

The SEARCHER is a crystal-controlled, single-conversion, handheld, narrow-band receiver designed to aid in the location of signal leaks on a cable system.

The SEARCHER is set to a specific channel's video carrier frequency and requires no special equipment at the headend since it peak detects the visual carrier signal (already in use on the system).

The FCC specifies the maximum signal leakage values for different frequency ranges. In the aircraft band, for instance, leakage is limited to 20 uV per meter at 3 meters. A commonly used frequency for testing is 133.2625 MHz (USA) (which is channel "C" or 16).

When the SEARCHER detects a leak that exceeds the Unit's minimum input level, it will alarm both visually (red LED) and audibly (a tone from the speaker). As you approach the source, the increasing signal strength causes the pitch of the audible tone to go higher. This changing pitch makes it very easy for you to pinpoint a leak.

In the case of very strong signals, the GAIN LO button allows the Unit to operate properly around signals that exceed -50 dBm at the antenna input.

The SEARCHER is a small lightweight unit, designed to be carried on the belt and has long operating life between battery charges. A LO BATT indicator LED signals when the battery needs recharging.

SPECIFICATIONS

FREQUENCY	User specified: Single channel 108.000 - 145.250 MHz.
SENSITIVITY	Factory adjusted to alarm at an input level of 1 uV (-107 dBm). Accuracy over operating temperature +/-6dB
IMAGE REJECTION	50 dB.
ANTENNA INPUT	50 ohm BNC female.
CONTROLS	Five membrane keypad switches: power ON and OFF; HI and LO volume; GAIN LO
TEMPERATURE	Operating: -18 to +50 degrees C Storage: -30 to +60 degrees C
ALARMS/INDICATORS	Leakage Detect: red LED and audible tone increasing from 600 to 3000 Hz as signal strength increases. Low Battery: red LED. Power ON: red LED.
POWER	8.7 volt NiCad battery supports 8 hours of continuous operation with 10% alarmed duty-cycle. Low battery alarm at 6.8 VDC. Recharges in 14 hours at 25mA.
CASE	Gray plastic, moisture-resistant case with belt clip.
DIMENSIONS	5.75"H X 3.6"W X 1.45"D. (9.2 cm X 14.6 cm X 3.7 cm) Flexible 1/4 wavelength antenna adds about 4" to height.
WEIGHT	13 ounces with antenna.
ACCESSORIES	Included with unit are: flexible 1/4-wavelength antenna, NiCad battery pack, battery charger.

OPERATING INSTRUCTIONS

CONTROLS

The membrane keypad has five keys.

ON turns the Unit on and illuminates the LED for POWER ON.
OFF turns the Unit off.
HI sets the audio volume to its high level.
LO sets the audio volume to its low level.
GAIN LO extends the Unit's dynamic range, allowing continued operation even when the leakage signal becomes very strong.

OPERATION PROCEDURES

Follow these procedures for long-time effective operation.

1. Do not treat the Unit carelessly. Any rugged unit can be damaged by being dropped or otherwise mistreated.
2. Do not leave the Unit in a closed vehicle in direct sunlight. High temperatures can build up and damage the Unit.
3. Protect the Unit from direct exposure to rain or other water. It is water resistant but not waterproof.

Follow these procedures to maintain operating power for your Unit.

1. SAVE the small black plug that is shipped in the charger jack. Place this plug back in the charger jack when the Unit is not going to be used for over 24 hours. When in place, the plug turns off the tiny battery drain that is normally required to keep the keyboard active. NOTE: Obviously, the Unit will be "dead" when the plug is in place.
2. Recharge the Unit each evening after use, in order to have the battery fully charged for the next day.
3. Do not use the Unit after the LO BATT light comes on. The light indicates that the battery level is too low for reliable operation. In addition, discharging the battery too far can damage it.

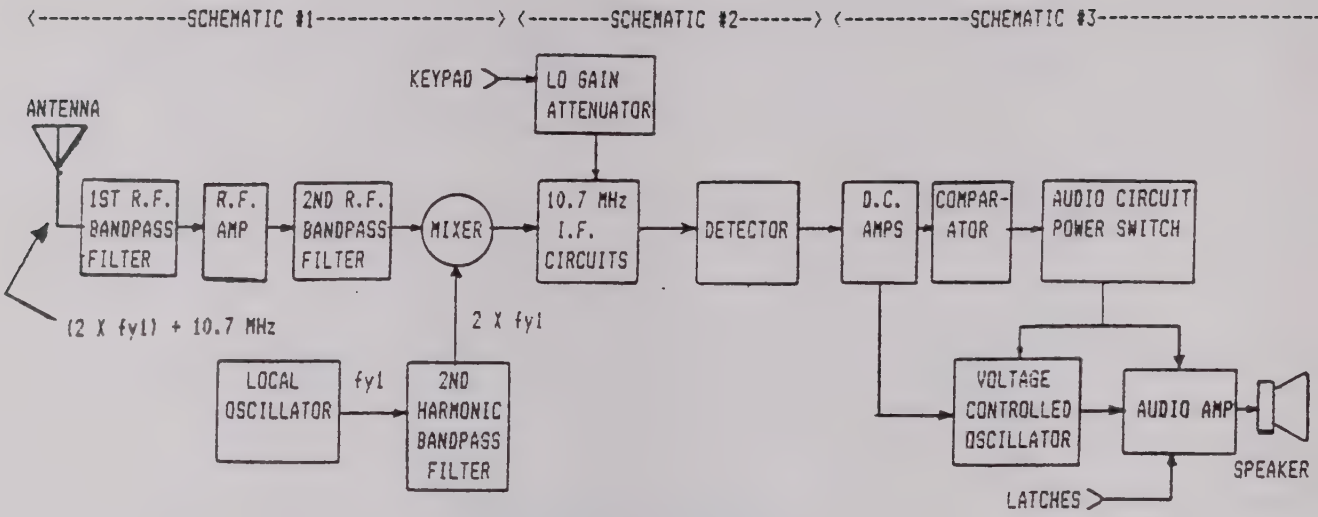
NORMAL OPERATION

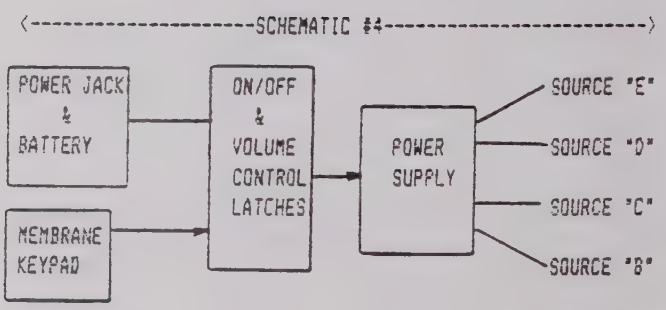
The Unit does not need special headend equipment. It requires only that standard program video material be present on the cable channel (14 through 18) that you selected for your Unit. When the signal strength reaching the antenna is high enough, the Unit will alarm.

If you wear the Unit on your belt, the closeness of your body will desensitize it slightly. Under this condition, it will take more than the minimum signal to cause the Unit to alarm. For normal operation (detecting smaller leaks) hold the Unit away from your body. When traveling in a vehicle, you would normally remove the flexible antenna and connect a (50-ohm) vehicle-mounted antenna.

When a leakage signal is just strong enough to cause the Unit to alarm, you will hear a medium-pitched (about 600 Hz) tone. Hold the Unit away from your body as you move about looking for the leak. If you get closer to the signal leak, the tone you hear will rise in pitch. For very strong signals, the tone may reach its limit (about 3000 Hz) before you actually

CIRCUIT DESCRIPTION





BLOCK DIAGRAM

CIRCUIT DESCRIPTION

This circuit description treats each of the circuit blocks separately. Study the block diagram and schematic diagram as you read; the titles of the circuit blocks are the same throughout the literature, in order to make studying easy. The Adjustable Components list, page 12 may also be useful.

ANTENNA INPUT

The antenna input is 50 ohms at the operating frequency and uses a BNC connector. When the signal field strength around the antenna is equal to the the Unit's minimum requirement, the input should send the Unit into the alarm condition.

FIRST RF BANDPASS FILTER

Inductors L1 and L2 and associated components form the first two-pole bandpass filter, with a 3 dB bandwidth of approximately 14 MHz. This filter provides the first image rejection preceeding RF amplifier Q1.

RF AMPLIFIER

Q1 is a common base, low-noise, RF amplifier driving the Second RF Bandpass Filter in its collector leg.

SECOND RF BANDPASS FILTER

This filter is similar to the first, using L3 and L4 to provide additional image rejection.

LOCAL OSCILLATOR/SECOND HARMONIC BANDPASS FILTER

Q8 is part of a crystal-controlled oscillator, operating on the crystal's second harmonic. The oscillator output is filtered by the two-pole filter composed of L5 and L6, tuned to the crystal's second harmonic. This eliminates all but the desired frequency, which is 10.7 Mhz below the frequency the Unit is set to (selected from channels 14 through 18). The output goes to Mixer Q2.

MIXER

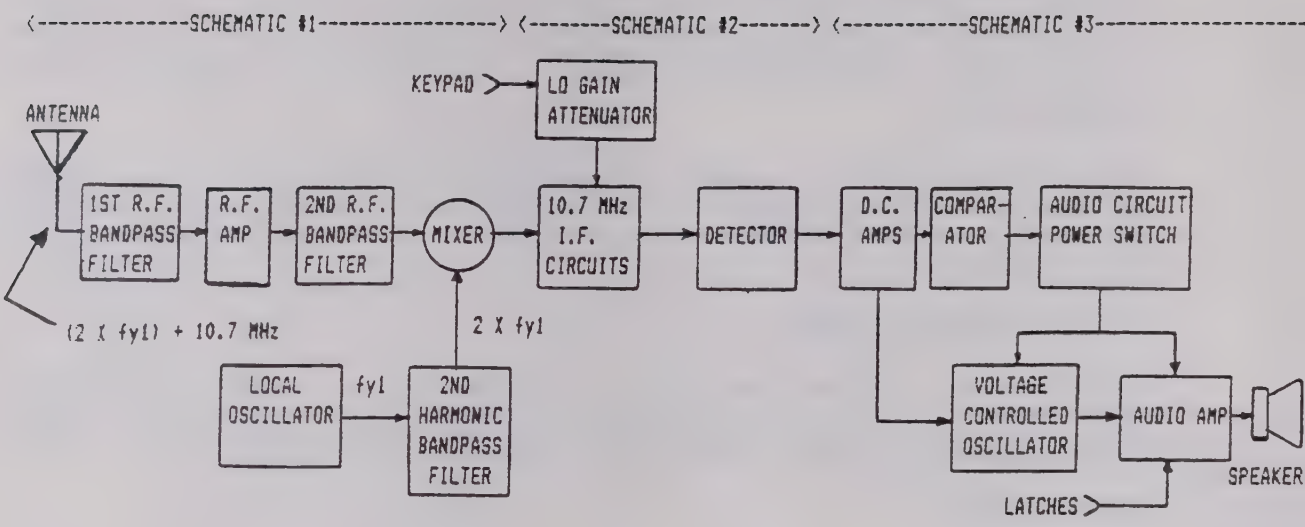
Q2 mixes the incoming RF signal with the frequency from the Local Oscillator. The 10.7 MHz output exhibits a conversion gain of about 20 dB.

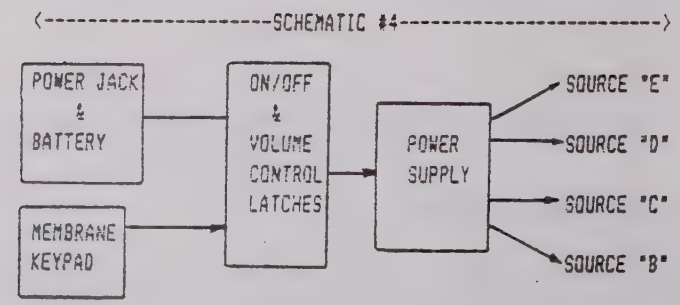
10.7 MHz IF CIRCUITS

The IF circuitry provides most of the Unit's amplification and sets the bandwidth to 18 kHz with the crystal filter. When the GAIN LO button is pressed Q4 switches in CR1, lowering the gain of the IF by about 30 dB.

DETECTOR

The amplified output of the IF circuitry is fed to a voltage doubler/detector (CR2 & CR3). The output is a DC voltage whose magnitude is proportional to the incoming RF signal strength.





BLOCK DIAGRAM

DC AMPS/COMPARATOR/SWITCH

U1A&B and U2B are configured as DC amplifiers and U2A as a comparator. U1A&B and U2B change the DC level from the peak detector to a suitable level to drive the Voltage Conrolled variable Oscillator U3. U2B's output also goes to the Comparator. Comparator U2A is normally high at pin 1 and switches to low when the DC level exceeds the threshold set by R48. This threshold is factory-set to respond to a signal strength of 1 uV at the Unit's antenna input. When the Comparator output goes low, Q9 is turned on, supplying power to alarm indicator diode CR4, the Voltage Controlled Oscillator, and the Audio Amplifier.

VOLTAGE CONTROLLED OSCILLATOR

This variable oscillator is turned on and off by the voltage from the Power Switch; the oscillator's frequency is controlled by the voltage from DC Amp U1B. DC levels of about 0.5 to 5.0 volts will result in frequencies from 600 Hz to 3000 Hz.

AUDIO AMP

U3 is a low-current audio amplifier feeding the 8-ohm miniature speaker. Resistor divider R62 and R63 scales the output of the Voltage Controlled Oscillator to match the requirements of the amp. Associated with the divider is the HI/LO volume circuit (C47, Q13, and U6). U6 is configured as a set-reset latch (see Membrane Keypad, which follows). Pressing volume LO turns Q13 on, essentially grounding C45 to reduce the Voltage Controlled Oscillator signal and lower the volume at the speaker. This state continues until the latch is reset by pressing the volume HI button.

POWER SUPPLY

The 8.7 VDC NiCad battery pack is the primary DC source. The charger jack disconnects the battery from the rest of the circuit, whenever the charger plug (or the shipping plug) is in place. Comparator U4B monitors the battery voltage and the regulated voltage; when the Unit is on, the PWR ON LED lights; when the battery voltage falls to 6.8 volts, the comparator changes state and the LO BATT LED lights.

Switching transistor Q12 is controlled by a set-reset latch (just as the volume control in the Audio Amp section, above) to turn the Unit on or off.

The voltage regulator is a low dropout circuit of U4A, Q10, and Q11, with diode CR6 supplying the reference voltage for comparator U4A. This circuit will operate until the battery voltage is within 0.3 volts of the regulated output voltage (battery down to 6.8 volts, supply voltage is 6.5 volts).

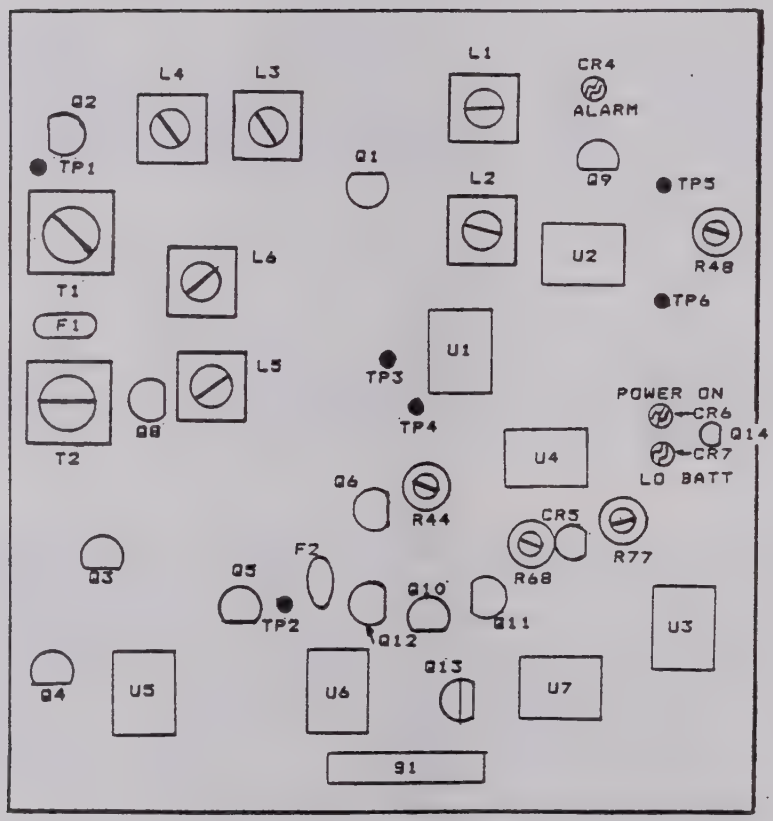
MEMBRANE KEYPAD

Note that the switch circuits for ON/OFF and for volume HI/LO each employ a set-reset latch. The other switch (GAIN LO) is simply a momentary short to ground through R17 to the base of Q4, for gain reduction in the IF. The latches always pull a small current (about 16 uA), except when the Charging Jack has a plug in it. Putting a plug in the jack cuts off the voltage to these latches, removing the plug restores the power to the multivibrators, and they might end up in either position (ON or OFF and volume LO or HI). So always check your Unit when you remove it from the charger-- if necessary, turn the Unit off until you need to use it.

ON/OFF Keys
Pressing ON sets U5A pin 3 with a low output, turning switch Q12 on. This supplies power to the regulator for the rest of the Unit's circuitry. Pressing OFF sets U5B pin 5 low, latching the other output high and turning transistor Q12 off.

Volume HI/LO Keys
Pressing volume LO sets U6B pin 5 high. This turns on Q13 and provides C45 as a path to ground for the audio signal. Consequently, less signal reaches the Audio Amp. Pressing volume HI turns Q13 off, effectively removing C45 from the circuit.

GAIN LO Key
This key lowers the gain of the 1st IF amplifier (Q3) through CR1. This allows the Unit to handle an additional 30 dB input range before the IF begins to limit and the detector output remains constant.



CIRCUIT BOARD LAYOUT DRAWING

TROUBLESHOOTING

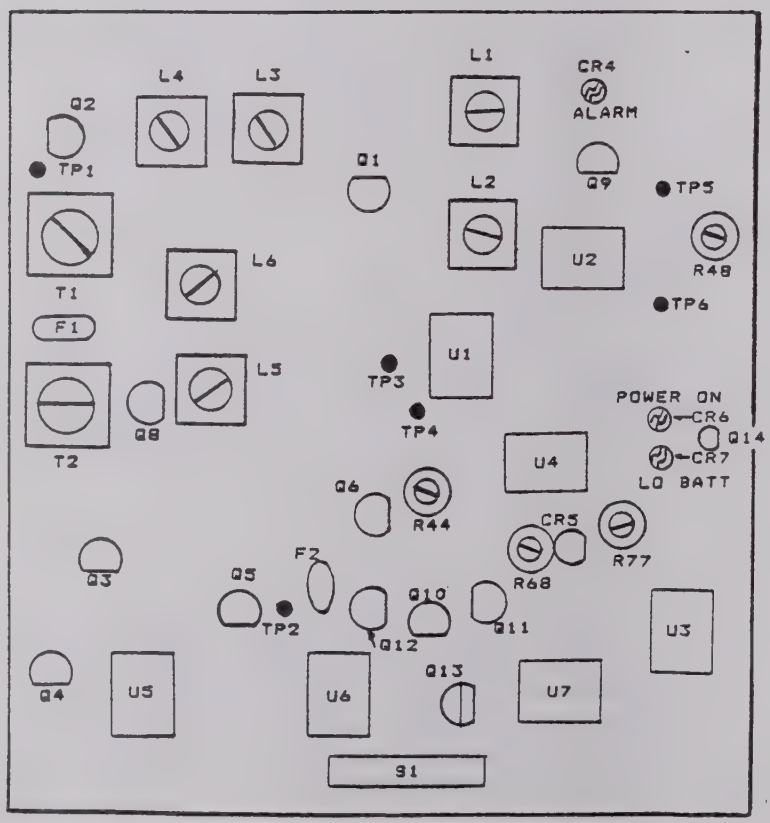
If you are having trouble, the following checks can help you in locating problem areas. Use Schematics, Circuit Diagrams, and the Circuit Board Layout Drawing to help you locate components and understand the different checkout operations. A listing on page 12 includes all controls inside the Unit and their functions.

SYMPTOM	POSSIBLE CAUSES, ACTIONS TO TAKE
Unit dead	1. Plug* is in charging jack, disconnecting battery. (* or dirt, oxidization) 2. Battery low, defective, or disconnected. Measure battery voltage; should be above 6.8 VDC for normal operation. Charge or replace as needed. 3. Regulator CR5 and associated circuitry. Check U1 pin 8; should be 6.5 VDC. Adjust R68 to set the voltage to 6.5 VDC. 4. Keypad ON & OFF switches. Check for continuity. 5. Latch circuit. Check output of U5 for hi/lo switching when ON/OFF keys are pressed. 6. Switch Q12. Should switch when key pressed.
Turns on but will not alarm as it should	1. Not enough voltage. Use steps 2 & 3 from above. 2. Some portion of RF, IF, or Audio circuitry is not performing as required. You may use the following steps to locate the trouble area. a. Use an RF CW generator to input the frequency that your Searcher is supposed to detect. Set the input to about 50 uV. b. Use an oscilloscope at TP2. You should find 10.7 MHz at about 0.5 V p-p. If not, try (c) and (d), below. c. (If step b failed) Check the 1st LO section by usinga frequency counter at the emitter of Q2. d. (If step b failed) If the first LO is operating, check the RF section with a sweep generator. e. If step b is okay, measure the DC level at TP3. It should be about 2.5 VDC with an input of 30 uV. f. If step e is okay, check TP4. The DC level should be about 2.5 VDC. g. If step f is okay, check the audio switch (TP5). Start with an RF input of less than 0.7 u volts; increase the signal until Q9 switches and TP5 goes high and the LED turns on (this should occur at about 0.7 uV). h. If step g is okay, check the audio amp and the voltage controlled oscillator.

ADJUSTABLE COMPONENTS LISTING

The following table lists all adjustable components and the area affected by each component, though some should not be adjusted under normal field service conditions. (The Alignment section covers components you might normally adjust.) All of these components are shown on the Component Location drawing.

Component	Adjustment Effect
L1, L2, L3, L4	R.F. Bandpass tuning
L5, L6	2nd Harmonic Bandpass tuning
T1, T2	I.F. alignment (10.7 MHz)
R44	VCO start frequency adjust
R48	Alarm threshold level adjust
R68	Power Supply voltage adjust
R77	Low Battery level adjust



CIRCUIT BOARD LAYOUT DRAWING (repeated)

ALIGNMENT PROCEDURE

You may wish to use the Circuit Board Layout Drawing to help you locate the different components called out in the following procedure.

Equipment Required:
- 50-ohm Signal Generator
- Power Supply, 10 volts, 100mA
- DC voltmeter
- Oscilloscope, 25 MHz bandwidth

1) Adjust the power supply
   - Set the external power supply to 8 volts.
   - Connect the power supply to the circuit board battery terminals
   - Connect a DC voltmeter to pin 8 of U1.
   - Adjust R68 for a reading of 6.50 ±0.01 VDC.

2) Adjust the low battery indicator.
   - Connect a voltmeter to the external power supply.
   - Reduce the power supply output until the low battery indicator (CR7) comes on.
   - Adjust R77 so that CR7 comes on when the external power supply drops below 6.80 ±0.01 VDC.

3) Peak the RF and IF.
   - Connect a 50-ohm signal generator (tuned to the unit's operating frequency) to the BNC antenna jack.
   - Connect an oscilloscope to TP2 and adjust the generator level so that a 10.7 MHz sinewave appears.
   - Adjust coils L1, L3, L3, L4, L5, L6, T1, & T2 to peak the signal at TP2.

5) Adjust the alarm level.
   - Reduce the signal generator output to approximately 1 uV.
   - Connect a DC voltmeter to TP5.
   - Connect an oscilloscope to pin 5 of U7.
   - Adjust R48 as you vary the generator level so the the unit alarms (TP5 switches from 0 to 6.5 VDC) at 0.7 uV (-110dBm) from the generator.
   - Check that CR4 is on and that there is an audio frequency (400-600 Hz) present at pin 5 of U7.
   - Alternately press the HI/LO volume switches; there will be an amplitude change of the audio signal at pin 5 of U7.
   - Adjust R44 so that the frequency of the audio signal (pin 5 of U7) is as near to 600 Hz (1.667 mS per period) as you can get it.

6) Check low gain mode
   - Increase the signal generator level until the alarm audio (pin 5 of U7) frequency no longer changes (around 3000 Hz).
   - Reduce the signal generator level from this point by 5 dB.
   - Press the low gain button and hold it.
   - Make sure the alarm is still on, but with a lower audio frequency (around 600 Hz).

This completes the field Alignment procedure.

REPLACEMENT PARTS LIST

CIRCUIT REF.NO.	DESCRIPTION	TRILITHIC PART NO.

*Components with an * have different values for different frequencies. These are for 133.25 MHz. See the end of the parts list for others.

Capacitors

C1*	4.0 pF	012-555-31
C2*	7 pF	012-555-02
C3*	1 pF	012-555-29
C4*	12 pF	012-555-05
C5*	47 pF	012-555-15
C6	39 pF	012-555-14
C7	0.01 uF	012-511-00
C8	680 pF	012-557-10
C9	680 pF	012-557-10
C10*	8 pF	012-555-03
C11*	1 pF	012-555-29
C12	0.01 uF	012-511-00
C13*	10 pF	012-555-04
C14*	18 pF	012-555-07
C15*	6 pF	012-555-25
C16	680 pF	012-557-10
C17	0.1 uF	012-526-00
C18	0.1 uF	012-526-00
C19	0.1 uF	012-526-00
C20	0.1 uF	012-526-00
C21	0.1 uF	012-526-00
C22	0.1 uF	012-526-00
C23	0.1 uF	012-526-00
C24	0.1 uF	012-526-00
C25	0.1 uF	012-526-00
C26	0.1 uF	012-526-00
C27		
C28		
C29	0.1 uF	012-526-00
C30	0.1 uF	012-526-00
C31	0.1 uF	012-526-00
C32	0.1 uF	012-526-00
C33	2.2 uF	012-273-00
C34	22 uF	012-592-00
C35	0.1 uF	012-526-00
C36	1500 pF	012-497-00
C37	0.1 uF	012-526-00
C38	0.1 uF	012-526-00
C39	22 uF	012-592-00
C40	0.1 uF	012-526-00
C41	0.47 uF	012-287-00
C42	10 uF	012-276-00
C43	0.01 uF	012-511-00
C44	0.1 uF	012-526-00
C45	680 pF	012-557-10
C46	0.1 uF	012-526-00
C47*	6 pF	012-555-25

C48*	1 pF	012-555-29
C49*	N.A.	
C50	68 pF	012-555-17
C51	56 pF	012-555-16
C52	680 pF	012-557-10
DIODES		
CR1	BA482	025-081-00
CR2	1N34	025-095-00
CR3	1N34	025-095-00
CR4	LED	025-191-00
CR5	LM336, 5.0 V Zener	076-213-00
CR6	LED	025-138-00
CR7	LED	025-138-00
INDUCTORS		
L1	5 1/2T	036-044-05
L2	5 1/2T	036-044-05
L3	5 1/2T	036-044-05
L4*	3 1/2T	036-044-03
L5	6 1/2T	036-044-06
L6	6 1/2T	036-044-06
L7	1 uH	035-001-00
L8	100 uH	035-041-00
L9	100 uH	035-041-00
L10	100 uH	035-041-00
INTEGRATED CIRCUITS		
U1	LM358	076-202-00
U2	LM358	076-202-00
U3	LM358	076-202-00
U4	LM358	076-202-00
U5	CD40107B	076-281-00
U6	CD40107B	076-281-00
U7	LM386	076-125-00
RESISTORS		
R1	1.2 k	045-713-00
R2	4.7 k	045-737-00
R3	8.2 k	045-748-00
R4	100	045-667-00
R5	8.2 k	045-748-00
R6	4.7 k	045-737-00
R7	1.2 k	045-713-00
R8	1.5 k	045-716-00
R9	4.7 k	045-737-00
R10	5.6 k	045-741-00
R11	22 k	045-765-00
R12	300	045-687-00
R13	470	045-695-00
R14	2.2 k	045-723-00
R15	1.2 k	045-713-00
R16	10 k	045-751-00
R17	10 k	045-751-00
R18	5.6 k	045-741-00

R19	22 k		045-765-00
R20	470		045-695-00
R21	2.2 k		045-723-00
R22	5.6 k		045-741-00
R23	22 k		045-765-00
R24	470		045-695-00
R25	2.2 k		045-723-00
R26	100 k		045-793-00
R30	470 k		045-821-00
R31	100 k		045-793-00
R32	100 k		045-793-00
R33	100 k		045-793-00
R34	100 k		045-793-00
R35	12 k		045-755-00
R36	470 k		045-821-00
R37	12 k		045-755-00
R38	470 k		045-821-00
R39	51 k		045-782-00
R40	51 k		045-782-00
R41	18 k		045-762-00
R42	100 k		045-793-00
R43	51 k		045-782-00
R44	10 k	variable	048-333-10
R45	100 k		045-793-00
R46	51 k		045-782-00
R47	1 M		045-835-00
R48	50 k	variable	048-333-13
R49	10 k		045-751-00
R50	10 k		045-751-00
R51	2.2 k		045-723-00
R52	100 k		045-793-00
R53	100 k		045-793-00
R54	51 k		045-782-00
R55	51 k		045-782-00
R56	51 k		045-782-00
R57	10 k		045-751-00
R58	100 k		045-793-00
R59	51 k		045-782-00
R60	51 k		045-782-00
R61	51 k		045-782-00
R62	10 k		045-751-00
R63	3.3 k		045-730-00
R64	5.6		045-615-00
R65	22		045-639-00
R66	2.2 k		045-723-00
R67	2.2 k		045-723-00
R68	50 k	variable	048-333-13
R69	22 k		045-765-00
R70	2.2 k		045-723-00
R71	10 k		045-751-00
R72	39 k		045-776-00
R73	68 k		045-786-00
R74	100 k		045-793-00
R75	22 k		045-765-00

R76	22 k		045-765-00
R77	50 k	variable	048-333-13
R78	18 k		045-762-00
R79	1.2 k		045-713-00
R80	3.3 k		045-730-00
R81	1 M		045-835-00
R82	1 M		045-835-00
R83	1 M		045-835-00
R84	1 M		045-835-00
R85	1 M		045-835-00
R86	1 M		045-835-00
R87	1 M		045-835-00
R88	1 M		045-835-00
R89	4.7 k		045-737-00
R90	56 k		045-784-00
R91	47		045-653-00
R92	10 k		045-751-00
R93	4.7 k		045-737-00
R94	270		045-685-00

TRANSISTORS

Q1	MPSH07	062-203-00
Q2	MPSH10	062-182-00
Q3	2N4124	062-177-00
Q4	2N4403	062-188-00
Q5	2N4124	062-177-00
Q6	2N4124	062-177-00
Q7		
Q8	2N4124	062-177-00
Q9	2N4403	062-188-00
Q10	2N4403	062-188-00
Q11	2N4401	062-211-00
Q12	2N4403	062-188-00
Q13	VN10KM	062-210-00
Q14	2N4124	062-177-00

MISCELLANEOUS

T1	Transformer 10.7 MHz	061-100-00
T2	Transformer 10.7 MHz	061-100-00
F1	Filter, 10.7 MHz crystal	071-071-00
F2	Filter, 10.7 MHz ceramic	071-064-01
Y1*	Crystal, 61.2750 MHz	023-060-12
S1	7-pin connector	054-135-07
S2	Micro phono connector	069-022-00
B1	7.2 VDC NiCad battery pack	009-025-00
SPK1	8-ohm miniature speaker	078-004-00
*	Antenna (133.25 MHz-- ch.16)	206-728-23
	Case with speaker and belt clip (order front panel overlay separately)	206-791-01
	Front panel overlay (with keypad)	058-256-00
	Battery charger (115 VAC)	206-747-00
TP1 through TP6	Terminal Test Point	059-125-00

* In the preceeding list, components with an asterisk may have different values, depending on the Unit's frequency. The parts listed in the preceeding list are for a 133.250 MHz (channel 16) Unit. The following lists indicate the values if your unit operates on a different frequency.

FREQUENCY KIT REPLACEMENT PARTS LISTS

Each of the following lists is marked with the frequency that applies.

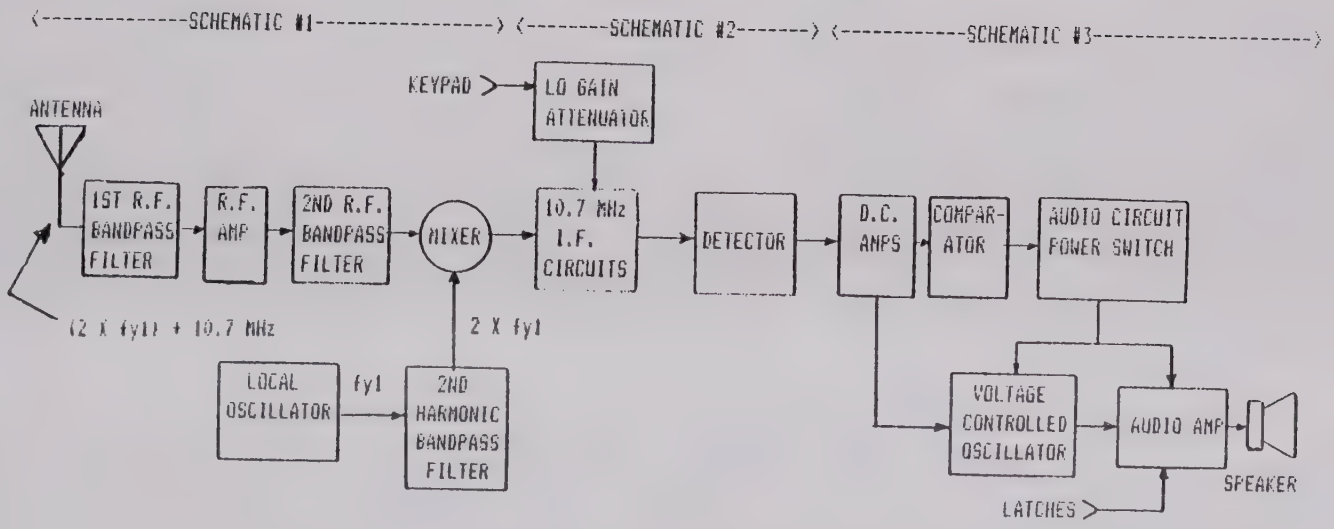
CIRCUIT REF.NO.	DESCRIPTION	TRILITHIC PART NO.
FREQUENCY = 121.250 MHz, ch.14		
C1	Capacitor, 5 pF	012-555-01
C2	Capacitor, 7 pF	012-555-02
C3	Capacitor, 1 pF	012-555-29
C4	Capacitor, 15 pF	012-555-06
C5	Not Used	
C6	Capacitor, 68 pF	012-555-17
C10	Capacitor, 8 pF	012-555-03
C11	Capacitor, 1 pF	012-555-29
C13	Capacitor, 7 pF	012-555-02
C14	Capacitor, 15 pF	012-555-06
C15	Capacitor, 8 pF	012-555-03
C47	Capacitor, 6 pF	012-555-25
C48	Capacitor, 1 pF	012-555-29
C49	Not Used	
L4	Inductor, 5-1/2 T	036-044-05
Y1	Crystal, 55.2750 MHz	023-060-11
	Antenna	206-728-21
FREQUENCY = 127.250 MHz, ch.15		
C1	Capacitor, 5 pF	012-555-01
C2	Capacitor, 6 pF	012-555-25
C3	Capacitor, 1 pF	012-555-29
C4	Capacitor, 12 pF	012-555-05
C5	Not Used	
C6	Capacitor, 68 pF	012-555-17
C10	Capacitor, 8 pF	012-555-03
C11	Capacitor, 1 pF	012-555-29
C13	Capacitor, 5 pF	012-555-05
C14	Capacitor, 15 pF	012-555-06
C15	Capacitor, 6 pF	012-555-25
C47	Capacitor, 6 pF	012-555-25
C48	Capacitor, 1 pF	012-555-29
C49	Not Used	
L4	Inductor, 5-1/2 T	036-044-05
Y1	Crystal, 58.2750 MHz	023-060-10
	Antenna	206-728-22

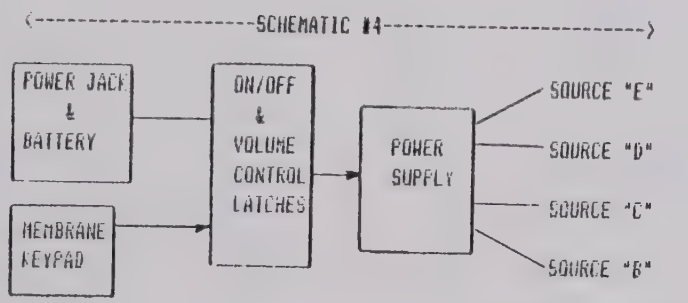
FREQUENCY = 139.250 MHz, ch.17

C1	Capacitor, 5 pF	012-555-01
C2	Capacitor, 5 pF	012-555-01
C3	Capacitor, 1 pF	012-555-29
C4	Capacitor, 10 pF	012-555-04
C5	Not Used	
C6	Capacitor, 68 pF	012-555-17
C10	Capacitor, 5 pF	012-555-01
C11	Capacitor, 1 pF	012-555-29
C13	Capacitor, 8 pF	012-555-03
C14	Capacitor, 12 pF	012-555-05
C15	Capacitor, 7 pF	012-555-02
C47	Capacitor, 6 pF	012-555-25
C48	Capacitor, 1 pF	012-555-29
C49	Not Used	
L4	Inductor, 3-1/2 T	036-044-03
Y1	Crystal, 64.2750 MHz	023-060-15
	Antenna	206-728-24

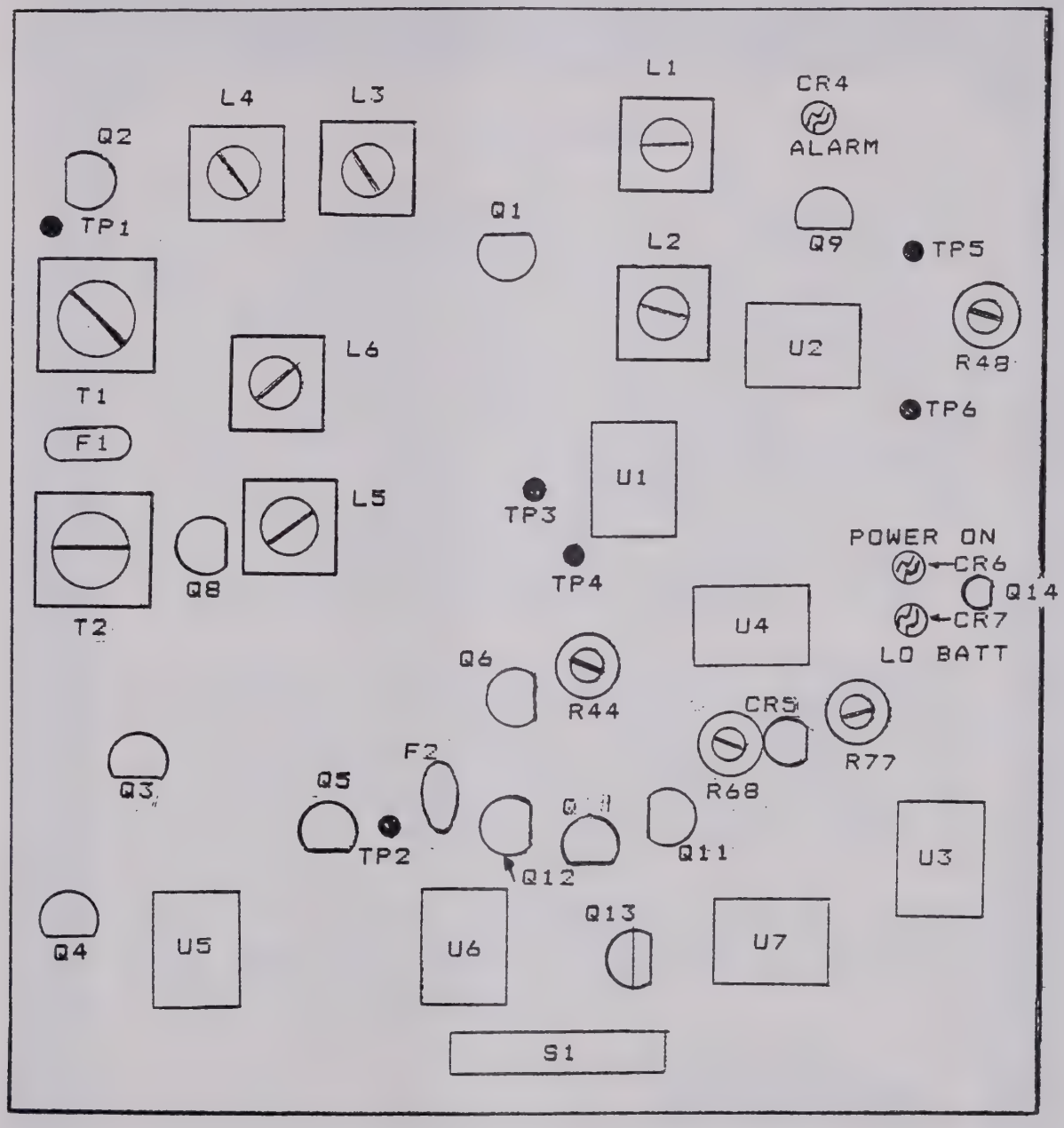
FREQUENCY = 145.250 MHz, ch.18

C1	Capacitor, 4.0 pF	012-555-31
C2	Capacitor, 5 pF	012-555-01
C3	Capacitor, 1 pF	012-555-29
C4	Capacitor, 10 pF	012-555-04
C5	Not Used	
C6	Capacitor, 68 pF	012-555-17
C10	Capacitor, 5 pF	012-555-01
C11	Capacitor, 1 pF	012-555-29
C13	Capacitor, 5 pF	012-555-01
C14	Capacitor, 10 pF	012-555-04
C15	Capacitor, 7 pF	012-555-02
C47	Capacitor, 6 pF	012-555-25
C48	Capacitor, 1 pF	012-555-29
C49	Not Used	
L4	Inductor, 3-1/2 T	036-044-03
Y1	Crystal, 67.2750 MHz	023-060-16
	Antenna	206-728-25





BLOCK DIAGRAM


L1
CR4
ALARM
L4
L3
Q2
TP1
Q1
Q9
TP5
L2
U2
R48
T1
L6
TP6
F1
U1
L5
TP3
POWER ON
CR6
Q14
TP4
Q8
T2
U4
CR7
LO BATT
Q6
R44
CR5
R77
F2
R68
Q3
Q5
TP2
Q12
Q11
U3
Q4
U5
U6
Q13
U7
S1

TWO YEAR WARRANTY

Trilithic Inc. warrants that each part of this product (except cathode ray tubes and batteries) will be free from defects in material and workmanship under normal use and service. Trilithic Inc.'s obligation under this warranty shall be limited to repairing or replacing, F.O.B. Indianapolis, Indiana, each part of the product (except cathode ray tubes and batteries) which is defective, provided that the buyer gives Trilithic, Inc. written notice of such defect within a period of two years commencing with the delivery of the product by Trilithic Inc. The Remedy set forth herein shall be the only remedy available to the buyer for breach of this warranty, and in no event shall Trilithic Inc. be liable for incidental or consequential damages for such breach. This warranty shall not apply to any part of the product which, without fault of Trilithic Inc., has been subject to alteration, failure caused by a part not supplied by Trilithic Inc., accident, fire or other casualty, negligence or misuse, or to any part rather than as a result of defect.

Except for warranties set forth above, and the warranties, if any, available to the buyer from the persons who supply Trilithic Inc. and cathode ray tubes or batteries contained in this product, there are no warranties, expressed or implied (including, without implied limitation, any implied warranties of merchantability or fitness), with respect to the condition of the product or their suitability for the use intended for them by the buyer or by the purchaser from the buyer.

In the event of failure of this product during the warranty period or a need for alignment or repair after the warranty period, contact out Customer Service department for return authorization and shipping instructions.

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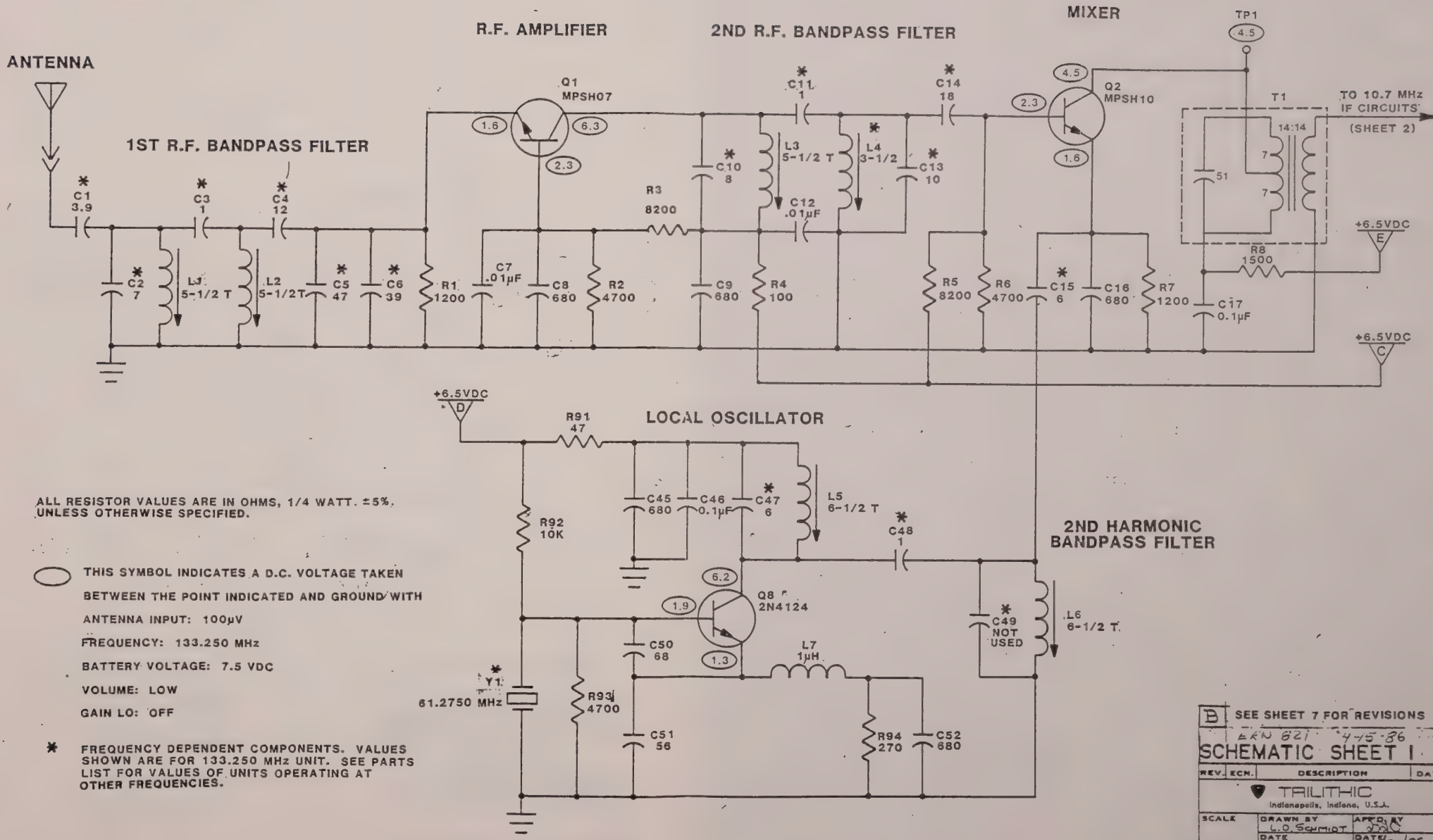
9202 E. 33rd Street
Indianapolis, IN 46236

317/895-3600



ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT. ±5%. UNLESS OTHERWISE SPECIFIED.

⬭ THIS SYMBOL INDICATES A D.C. VOLTAGE TAKEN BETWEEN THE POINT INDICATED AND GROUND WITH

ANTENNA INPUT: 100µV

FREQUENCY: 133.250 MHz

BATTERY VOLTAGE: 7.5 VDC

VOLUME: LOW

GAIN LO: OFF

* FREQUENCY DEPENDENT COMPONENTS. VALUES SHOWN ARE FOR 133.250 MHz UNIT. SEE PARTS LIST FOR VALUES OF UNITS OPERATING AT OTHER FREQUENCIES.

B SEE SHEET 7 FOR REVISIONS

ERN 821 4-15-86

SCHEMATIC SHEET 1

REV.	ECN.	DESCRIPTION	DATE

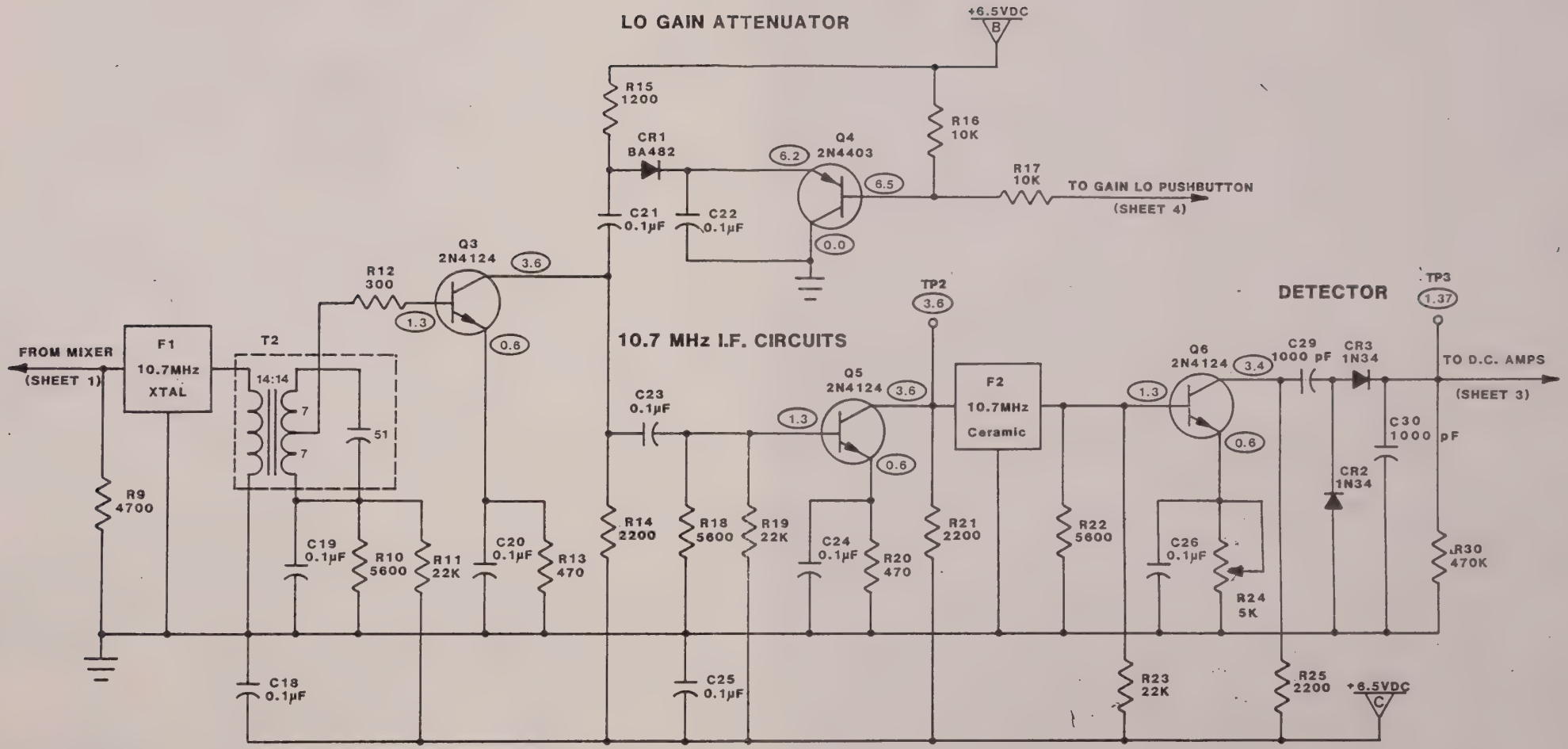
TRILITHIC
Indianapolis, Indiana, U.S.A.

SCALE	DRAWN BY	APPD. BY
	L.D. SCHMIDT	JAC
	DATE 8 JAN 86	DATE 11/31/86

SEARCHER FINAL ASSY

SHEET 1 OF 7

B 201-355-( )



ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT ±5%, UNLESS OTHERWISE SPECIFIED.

ALL CAPACITOR VALUES ARE IN PICOFARADS UNLESS OTHERWISE SPECIFIED.

⬭ THIS SYMBOL INDICATES A D.C. VOLTAGE TAKEN WITH A HIGH INPUT IMPEDANCE VOLTMETER BETWEEN THE POINT INDICATED AND GROUND WITH

ANTENNA INPUT: 100µV

FREQUENCY: 133.250 MHz

BATTERY VOLTAGE: 7.5 VDC

VOLUME: LOW

GAIN LO: OFF

C SEE SHEET 7 FOR REVISIONS

ERN 821 4-15-86

SCHEMATIC SHEET 2

REV.	ECN.	DESCRIPTION	DATE

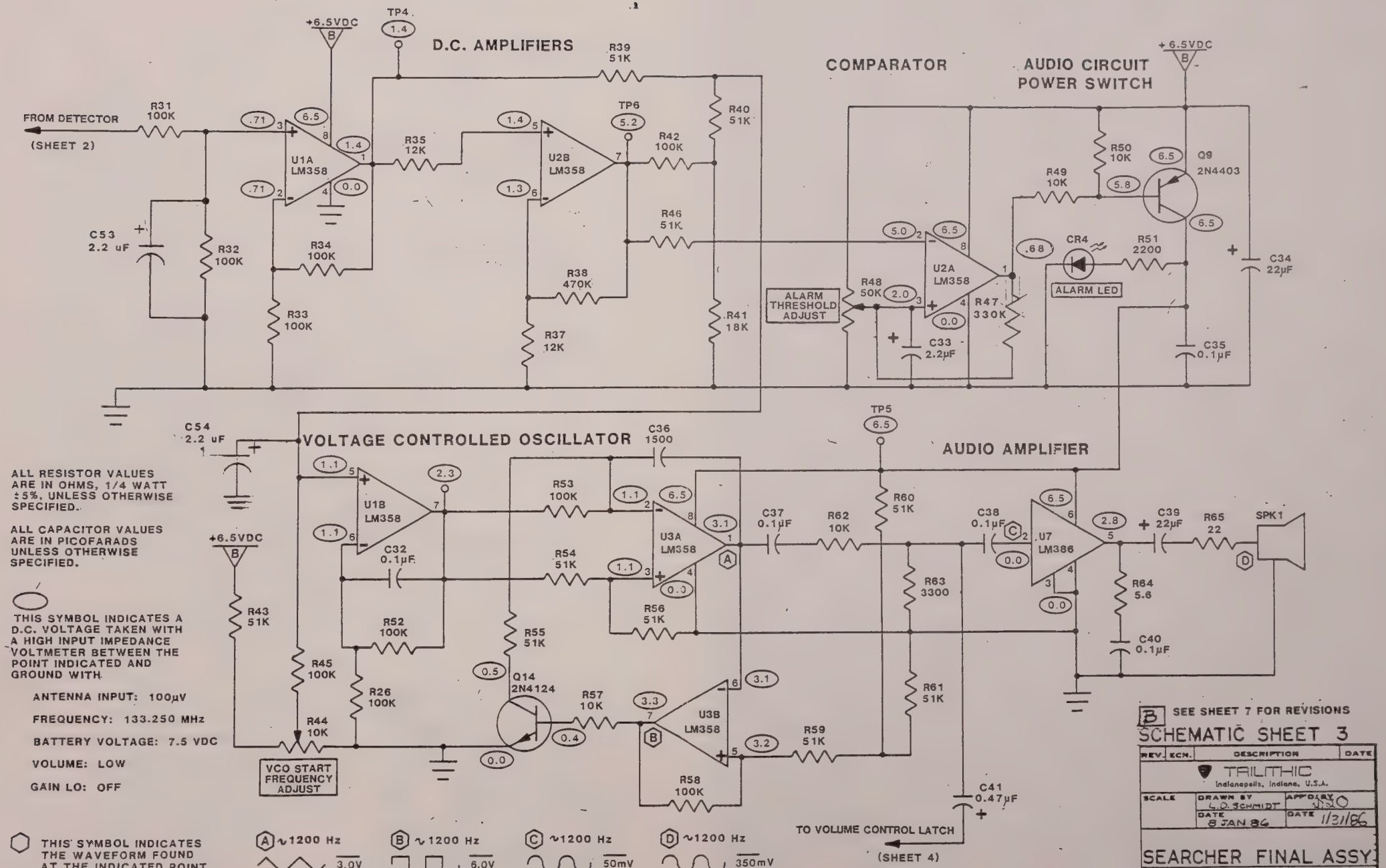
TRILITHIC
Indianapolis, Indiana, U.S.A.

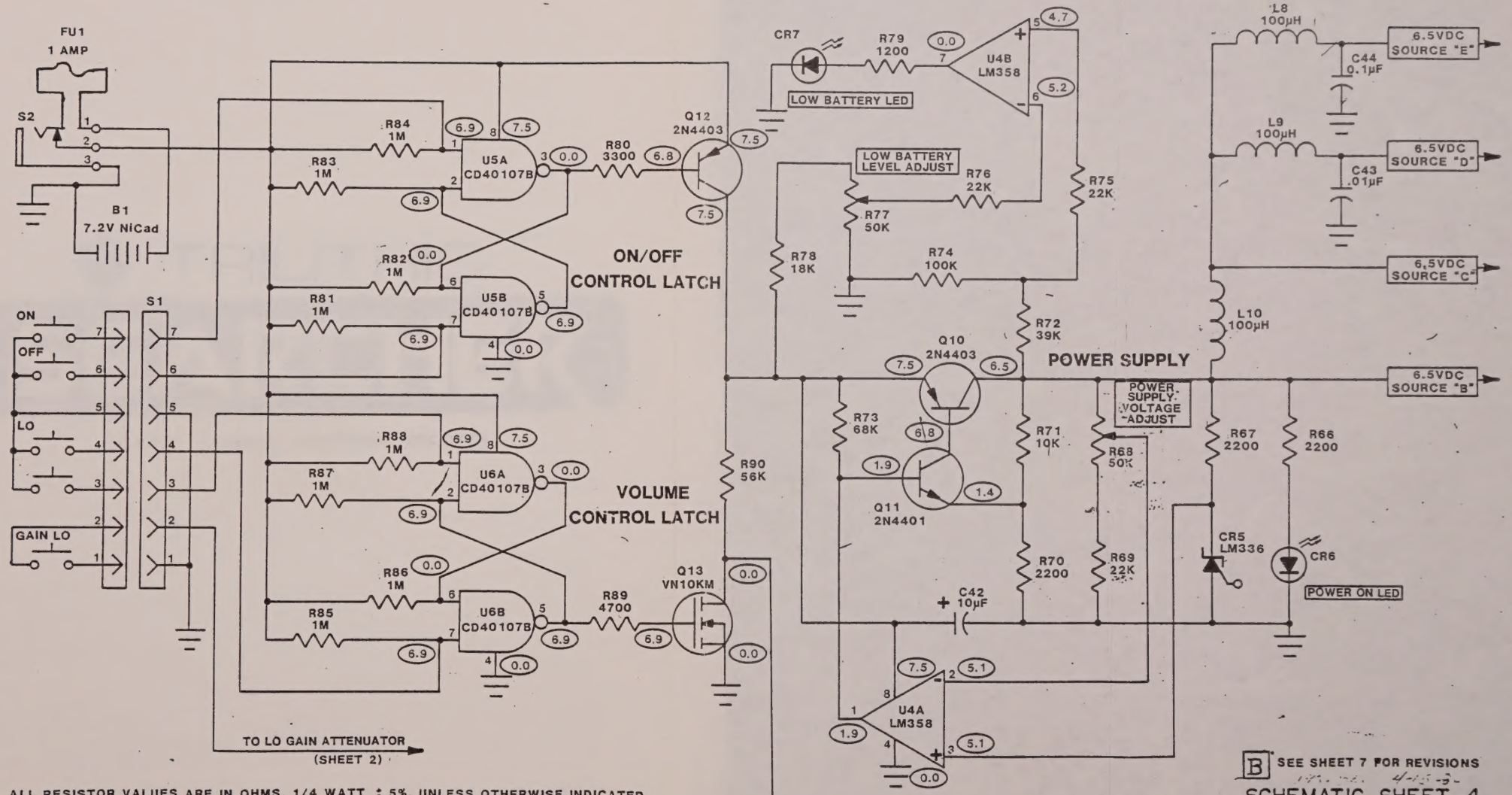
SCALE	DRAWN BY	APP'D BY
	L.D. SCHMIDT	JSD
	DATE 8 JAN 86	DATE 1/31/86

SEARCHER FINAL ASSY

SHEET 3 OF 7

B 201-355-( )


D.C. AMPLIFIERS
COMPARATOR
AUDIO CIRCUIT POWER SWITCH
VOLTAGE CONTROLLED OSCILLATOR
AUDIO AMPLIFIER
+6.5VDC
TP4
TP5
TP6
FROM DETECTOR
(SHEET 2)
R31 100K
R32 100K
R33 100K
R34 100K
R35 12K
R37 12K
R38 470K
R39 51K
R40 51K
R41 18K
R42 100K
R46 51K
C53 2.2 uF
U1A LM358
U2B LM358
U2A LM358
R48 50K
R47 330K
C33 2.2µF
ALARM THRESHOLD ADJUST
R50 10K
R49 10K
Q9 2N4403
CR4
ALARM LED
R51 2200
C34 22µF
C35 0.1µF
C54 2.2 uF
C36 1500
U1B LM358
U3A LM358
R53 100K
R54 51K
R56 51K
C32 0.1µF
R52 100K
R55 51K
R57 10K
Q14 2N4124
U3B LM358
R58 100K
R59 51K
R61 51K
R43 51K
R45 100K
R26 100K
R44 10K
VCO START FREQUENCY ADJUST
C37 0.1µF
R62 10K
R60 51K
R63 3300
C38 0.1µF
U7 LM386
C39 22µF
R65 22
SPK1
R64 5.6
C40 0.1µF
C41 0.47µF
TO VOLUME CONTROL LATCH
(SHEET 4)
ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT ±5%, UNLESS OTHERWISE SPECIFIED.
ALL CAPACITOR VALUES ARE IN PICOFARADS UNLESS OTHERWISE SPECIFIED.
THIS SYMBOL INDICATES A D.C. VOLTAGE TAKEN WITH A HIGH INPUT IMPEDANCE VOLTMETER BETWEEN THE POINT INDICATED AND GROUND WITH.
ANTENNA INPUT: 100µV
FREQUENCY: 133.250 MHz
BATTERY VOLTAGE: 7.5 VDC
VOLUME: LOW
GAIN LO: OFF
THIS SYMBOL INDICATES THE WAVEFORM FOUND AT THE INDICATED POINT.
A ~1200 Hz 3.0V
B ~1200 Hz 6.0V
C ~1200 Hz 50mV
D ~1200 Hz 350mV
B SEE SHEET 7 FOR REVISIONS
SCHEMATIC SHEET 3
REV. ECN. DESCRIPTION DATE
TRILITHIC
Indianapolis, Indiana, U.S.A.
SCALE
DRAWN BY L.D. SCHMIDT
DATE 8 JAN 86
APP'D BY
DATE 11/31/86
SEARCHER FINAL ASSY
SHEET 3 OF 3
B 201-355-( )



ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT ± 5%, UNLESS OTHERWISE INDICATED.

ALL CAPACITOR VALUES ARE IN PICOFARADS UNLESS OTHERWISE INDICATED.

⬭ THIS SYMBOL INDICATES A D.C. VOLTAGE TAKEN WITH A HIGH INPUT IMPEDANCE VOLTMETER BETWEEN THE POINT INDICATED AND GROUND WITH

ANTENNA INPUT: 100µV
FREQUENCY: 133.250 MHz
BATTERY VOLTAGE: 7.5 VDC
VOLUME: LOW
GAIN LO: OFF

B SEE SHEET 7 FOR REVISIONS

SCHEMATIC SHEET 4

REV.	ECN.	DESCRIPTION	DATE

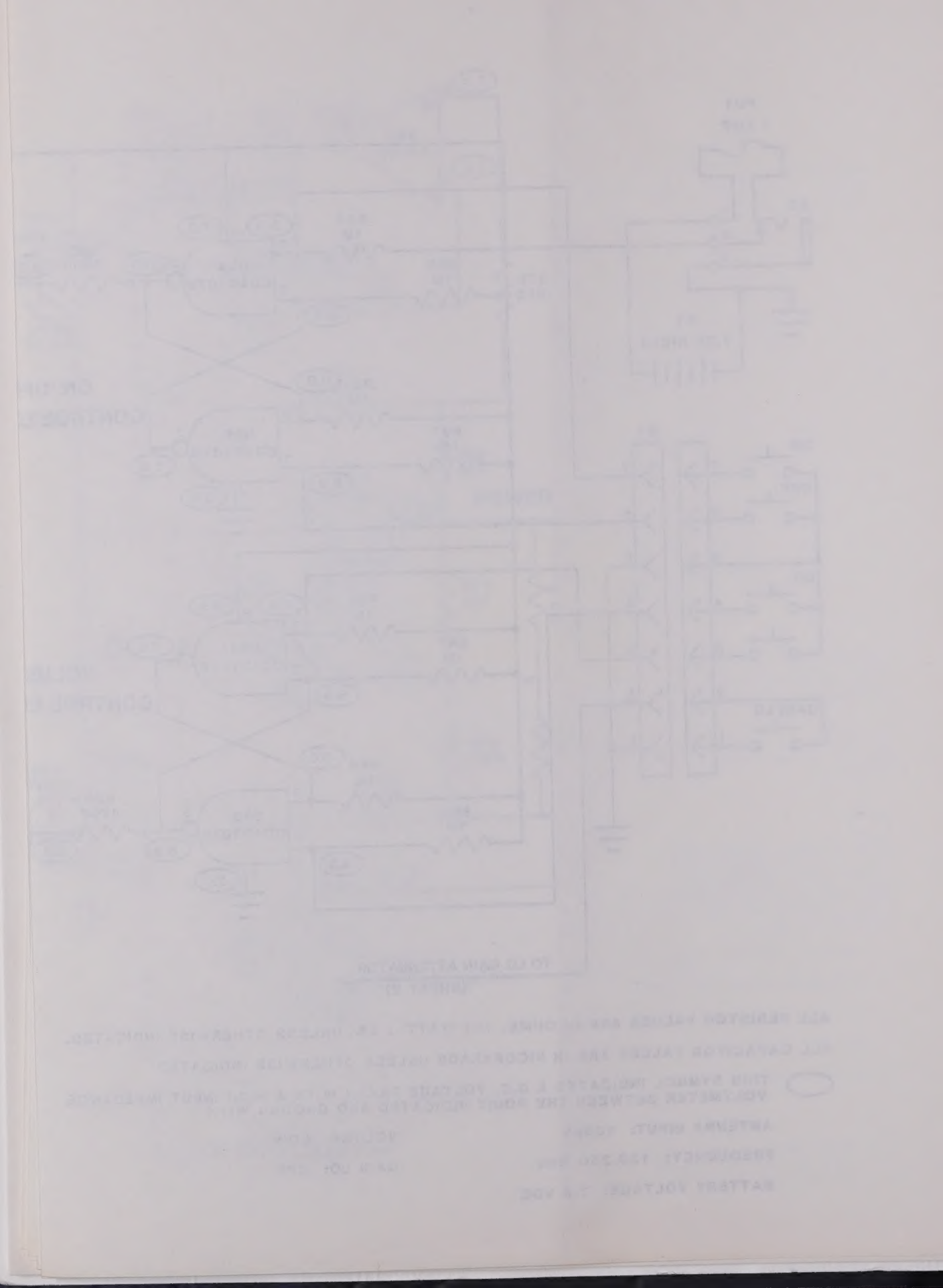
TRILITHIC
Indianapolis, Indiana, U.S.A.

SCALE	DRAWN BY	APPD BY
	L.D.SCHMIDT	
	DATE 8 JAN 86	DATE 1/31/86

SEARCHER FINAL ASSY

SHEET 4 OF 7

B 201-355-( )



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